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THE CONTACT OF THE ARCHÆAN AND POST-ARCHÆAN IN THE REGION OF THE GREAT LAKES.

THE accompanying map has been compiled from one published by the Geological Survey of Canada, to which was added the Adirondack region from one published in Van Hise's *Pre-Cambian Geology*. "Archæan" is used to include the Huronian and Laurentian, as originally proposed by Dana. It does not here include the Animikie or Keweenawan, which are considered post-Archæan. With this exception, Archæan is here used as the equivalent of the pre-Cambrian of many writers.

The purpose of this paper is to bring out the peculiar step-like arrangement of the contact between the Archæan and post-Archæan in the region of the Great Lakes. This is shown clearly on the map, where a heavy line has been drawn to emphasize this feature. The contact is further marked by the almost universal elevation of the Archæan several hundred feet above the succeeding formations.

Beginning at the St. Lawrence on the east, we find the line of contact runs about 10° N. of W. to the southeastern corner of the Georgian Bay. The Archæan fronts the Paleozoic sediments nearly always as a hill rising one hundred or more feet above them. It is true the Archæan underlies the sediments, and perhaps as a fairly regular plain, but it would seem that there has been some disturbance by which a part of the Archæan has been relatively depressed. The contact of the Paleozoic follows closely this line of movement covering the lower part and abutting against the higher.[1]

The east shore line of the Georgian Bay runs 30° W. of N., and this may be taken as the line of contact. Only in the southeast corner do post-Archæan rocks appear. The Archæan rises in hills a few hundred feet above the water line.

The contact north of Lake Huron again runs 10° N. of W.

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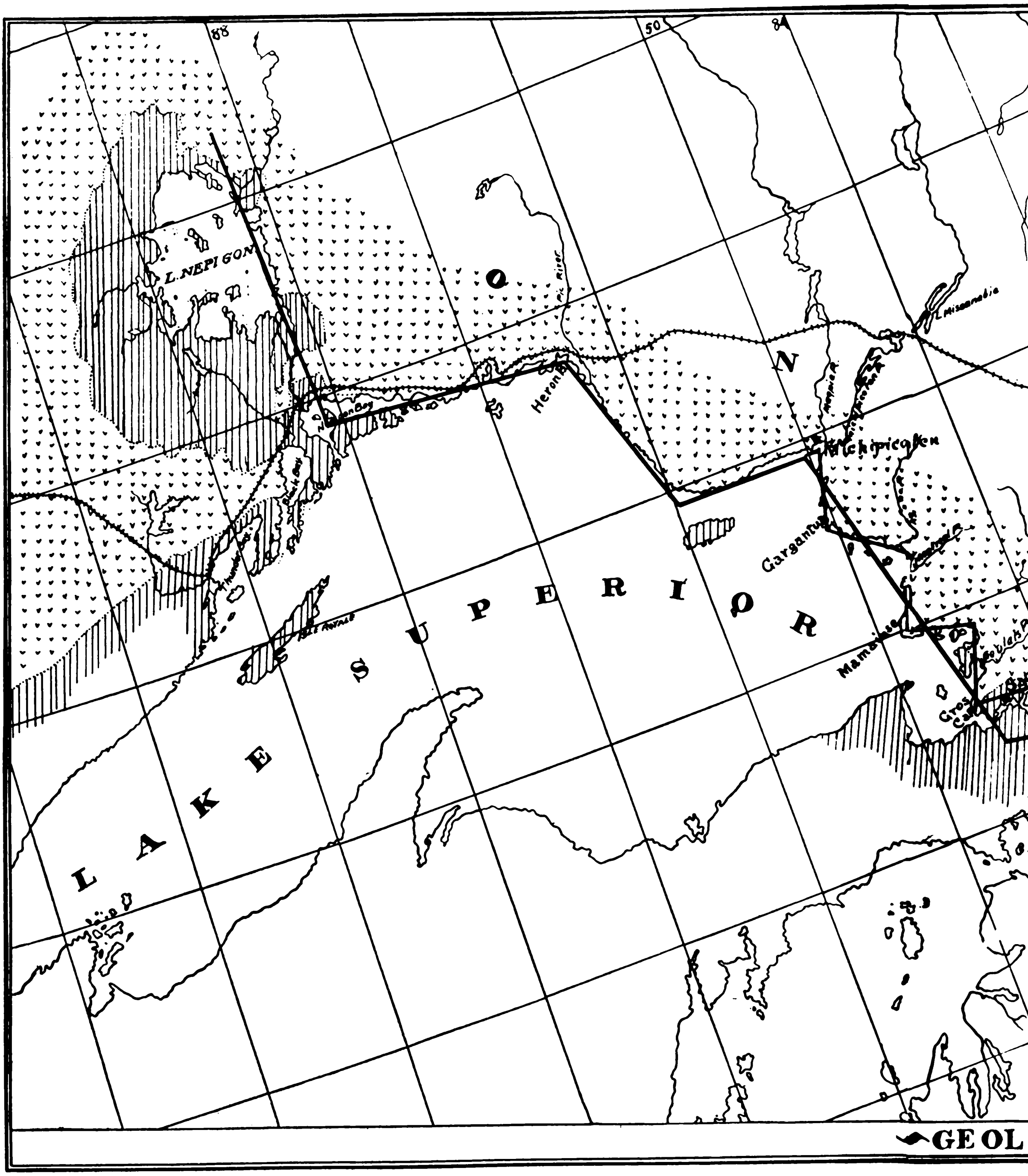
[1] Compare WILSON, JOURNAL OF GEOLOGY, Vol. XI, p. 651 ff.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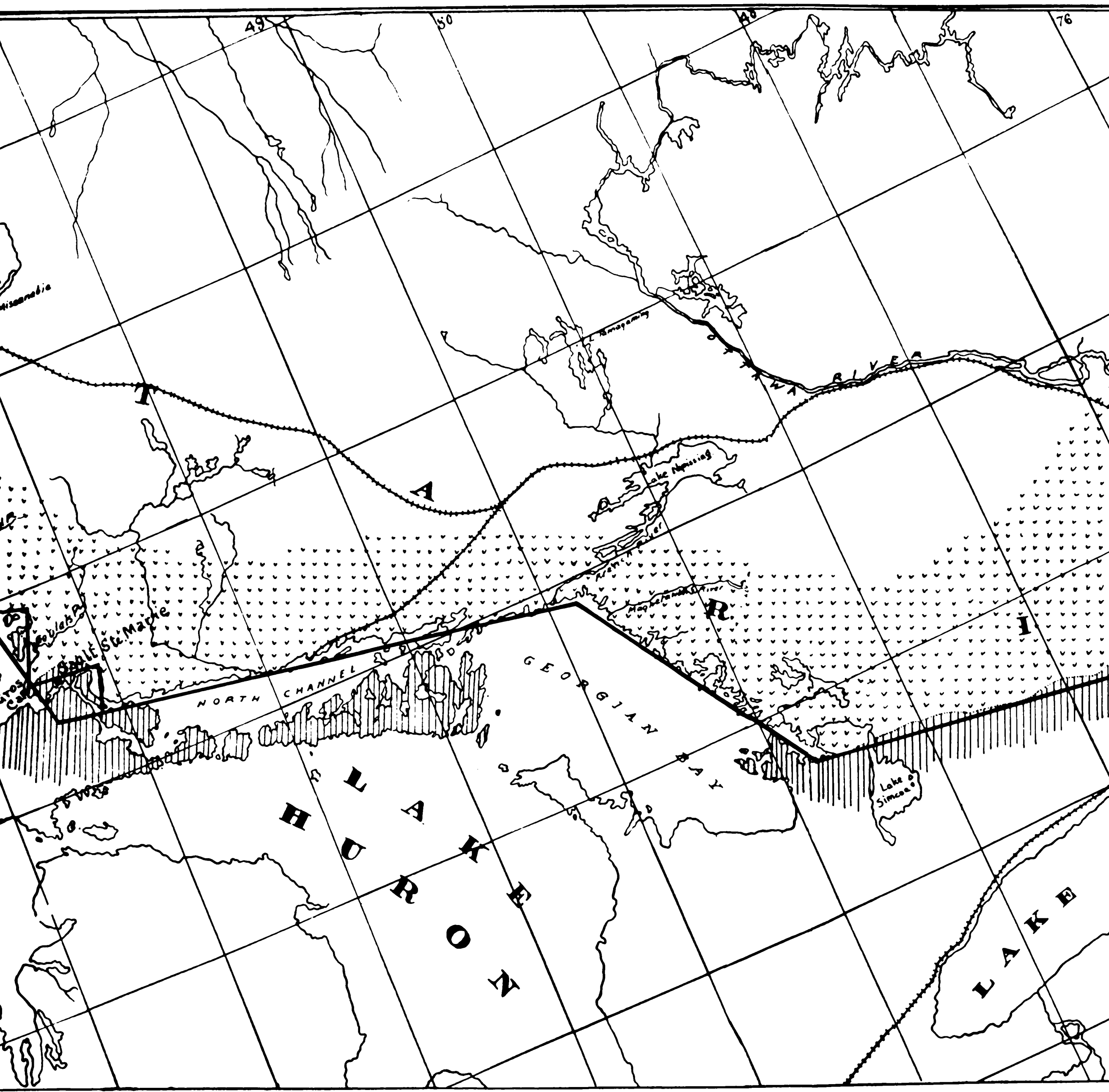
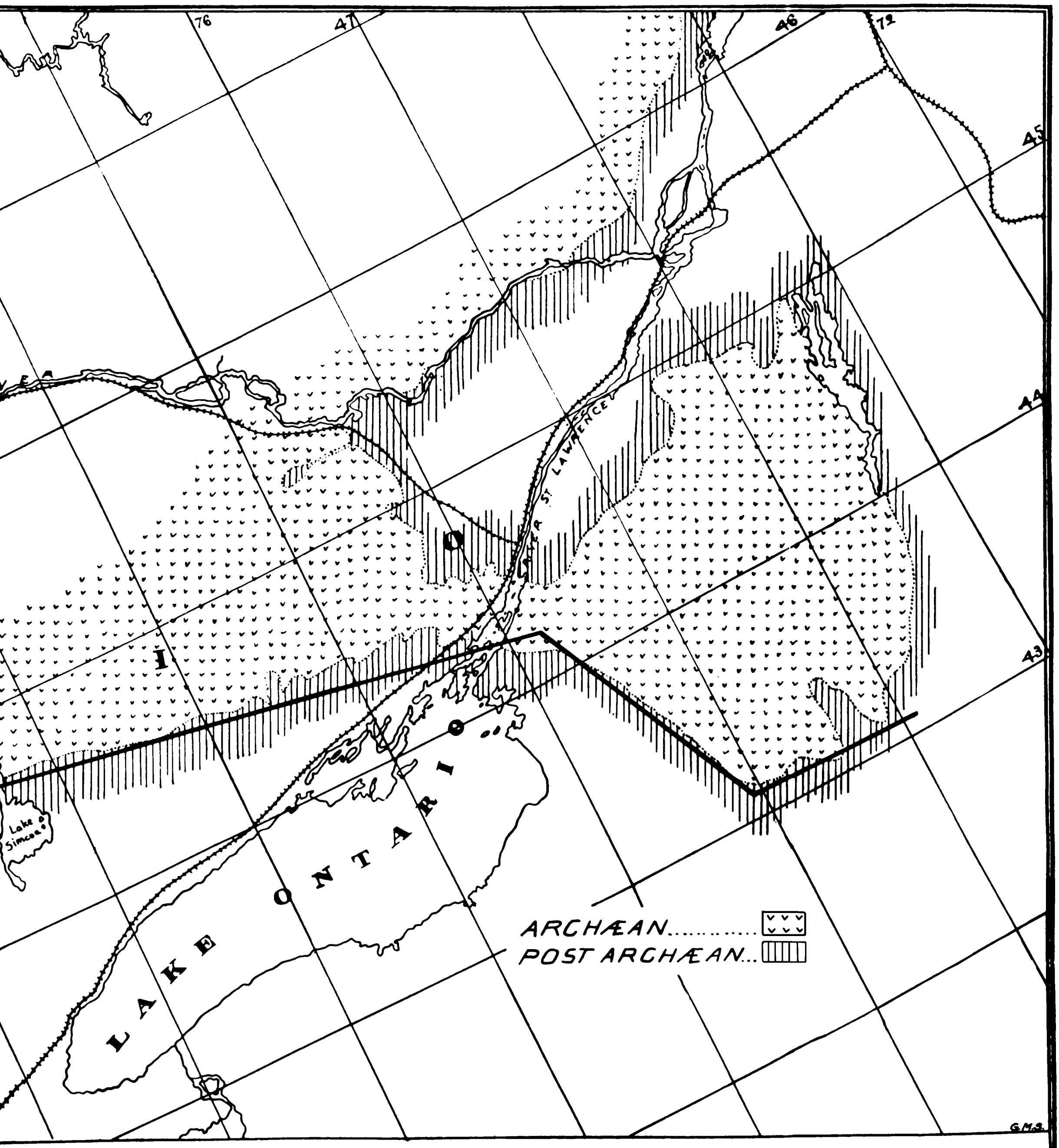


GEOLOGICAL MAP OF THE GREAT LAKES REGION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As before, the Archæan hills rise several hundred feet above the waters of the lake, and the post-Archæan sediments abut against them at the water's edge.

The general direction of the shore line from Sault Ste. Marie to Michipicoten is 15° W. of N. It is, however, not so regular as other parts of the coast. At Gross Cap, Mamainse and Gargantua the Archæan projects to the west in three sharp teeth with deep bays between. At each point there occurs a small area of Keweenawan rocks lying almost flat and rising but little above the waters of the lake. The Archæan hills rise, on the contrary, almost vertically for several hundred feet, and at a few miles from the shore reach as much as 1,200 feet. The line of dislocation in this region is not straight. but serrate. The general direction of all the north-bearing lines is, however, preserved.

From Michipicoten the shore line trends due west, rising in steep, precipitous hills. No post-Archæan sediments are found in contact with the Archæan, but Michipicoten Island of Keweenawan age is only a few miles south.

From the mouth of the Pucaswa River the shore line bears about 18° W. of N., having the same high, precipitous Archæan cliffs, and with no post-Archæn sediments above water level.

From Heron Bay the shore line again bears about 10° N. of W. as far as Nipigon Bay. Archæan hills rise perpendicularly several hundred feet above the lake. In Nipigon Bay Keeweenawan sediments appear, with interbedded lava sheets, the whole rising several hundred feet above the level of Superior.

The contact here turns again to the north, but on the map does not appear to be so definite. The Archæan hills do not rise in vertical cliffs along the eastern shore of Lake Nipigoan, and in consequence the lava flows of the Keweenawan, having no definite walls to impinge against, spread out in irregular bays. The east shore of Lake Nipigon is prolonged into a deep, narrow bay at the south, and from this a valley leads through to Lake Superior, which is believed by Parks to be an old outlet of the lake. This valley and bay are in direct line with the east shore of Lake Nipigon and are taken to represent the counterpart of the coast lines described in earlier paragraphs. The Archæan to the west of the line is much lower than that to the east of it, and is separated from it by a deep valley. The Keweenawan to the east of the line on Lake Nipigon is a shallow overflow. The physical features of this line are thus similar to the others, but with the characters less marked, due probably to the fading out of the force-producing dislocation.

Eastward from the St. Lawrence the contact seems to run 25° S. of E. and then east. With this region I am not personally familiar, but believe that here also the Archæan rises in steep hills above the adjoining, low-lying post-Archæan.

The two facts brought out above, viz., the step-like regularity of the lines of contact, and the difference in altitude of the rocks of the two periods, can be best explained, I believe, by assuming a dislocation in the Archæan before the deposition of the post-Archæan sediments. The southern part was depressed and probably changed in inclination, as suggested by Wilson in the paper quoted above. Sediments were deposited over this depressed part and abutted against the cliffs of the northern part. They also extended into the deeper valleys of the northern part. Perhaps even a considerable portion of the northern part was thinly covered, but, if so these rocks have since been removed.

The regularity of the dislocation extends from longitude 75° to longitude 88°, and from latitude 43° to latitude 50°, or for 700 miles by 500. For the greater part of the distance this line of fracture forms the northern and eastern shores of Superior and Huron.

A. B. WILLMOTT.

SAULT STE. MARIE, CANADA.
January 21, 1904.